

Air Quality, Georgia Tech, and the Fall line Air Quality Study (FAQS)

The Team. As proposed in the Fall line Air Quality Study (FAQS), Dr. Michael Chang will be the administrative lead for the study. Dr. William Chameides will head the ambient monitoring and analysis team. Dr. Ted Russell will preside over the emission inventory and air quality modeling team. Dr. C.S. Kiang will serve as senior advisor to the project.

Michael Chang. Chang is currently the Director of the Center for Urban and Regional Ecology and a research scientist in the School of Earth and Atmospheric Sciences. Previously, he served as Coordinator for the Office of Scientific Development in the Georgia Environmental Protection Division, Air Protection Branch. Among the recent programs he has been involved with:

- He is the leader of the EPD sponsored program to Forecast Ground-level Ozone Concentrations in Atlanta, Georgia in support of the State's Partnership for a Smog-free Georgia.
- He was the lead air quality modeler for the EPD (1992 - 1998, completing all air quality simulations in support of the 1994 and 1998 State Implementation Plans (SIP) for the Atlanta Ozone Nonattainment Area. He drafted the majority of the 1998 SIP.

William Chameides. Chameides is currently the Smithgall Chair and Regents Professor, and former Director (1989-1994) of the School of Earth and Atmospheric Sciences at Georgia Tech. He is a fellow of the American Geophysical Union, and a member of the National Academy of Sciences (the latter being one of the highest honors that the nation can bestow upon a scientist; Chameides is one of only three such members on the entire Georgia Tech faculty). Among the recent programs he is involved with:

- He is the Chief Scientist of the Southern Oxidants Study (SOS) and Director of SOS' Southern Center for the Integrated Study of Secondary Air Pollutants (SCISSAP). Collectively, these two programs attempt to elucidate the causes of ground-level ozone and fine particle pollution in the Southern United States and the characteristics of an effective and integrated approach for their mitigation.
- He is the U.S.A. Study Director of CHINA-MAP, an international research program studying the effects of environmental change on agriculture in China.
- He serves as the Co-Chair of the Synthesis Team for the North American Research Strategy for Tropospheric Ozone (NARSTO), a group of Canadian, Mexican, and U.S. scientists charged with writing the 1998 Assessment Document for NARSTO.
- He also serves as the Chair of the National Research Council's Committee on Ozone Forming Potential of Reformulated Gasoline, which is addressing the environmental effects of ethanol and other oxygenates in reformulated gasoline.

Ted Russell. Russell is currently the Georgia Power Distinguished Professor of Environmental Engineering in the School of Civil and Environmental Engineering and Director of the Air Resources and Engineering Center (AREC). His research and teaching interests are in air pollution engineering, and in particular identifying and developing technologies and strategies to reduce the costs of improving air quality. Among his current and recent research programs:

- He developed the Urban-Regional Model (URM), a three-dimensional photochemical-transport air quality model for investigating factors contributing to air quality and assessing potential strategies to improve it.
- He leads the air quality modeling team of the Southern Appalachian Mountain Initiative (SAMI), a cooperative effort to identify and recommend reasonable measures to remedy existing and to prevent future adverse effects from human-induced air pollution on the air quality related values of the Southern Appalachians, primarily those in Class I park and wilderness areas, and weighing the environmental and socioeconomic implications of any recommendations.
- Along with Chameides, he also helped create the Southern Oxidants Study's Southern Center for the Integrated Study of Secondary Air Pollutants (SCISSAP).
- Russell has also served on numerous state and national committees on air quality including: the National Research Council's committees on Ozone Formation and Control, and Risk Assessment to Hazardous Air Pollutants; the US Environmental Protection Agency's Ozone, Particulate Matter, and Regional Haze Federal Advisory Committee, and the Oxygenated Fuels Program Review Committee; and the North American Research Strategy for Tropospheric Ozone Program Review Committee.

C.S. Kiang. Kiang is currently Institute Professor and former Director (1981-1988) of the School of Earth and Atmospheric Sciences. He is also the past Director of the Southern Oxidants Study (1988-1993), Director of the Office of Environmental Sciences, Technology and Policy (1991-1992), and Head of the Atmospheric Aerosol Project at the National Center for Atmospheric Research in Boulder, Colorado (1974-1978). Among the important projects he has developed include:

- He and Professor D. Davis created the Global Atmospheric Measurement Experiment – Tropospheric Aerosol and Gases (GAMETAG) that was the basis for the establishment of the Atmospheric Chemistry Program at the National Science Foundation, and provided the basic concept for the NASA Global Tropospheric Experiments Program.
- As the Director of the School of Geophysical Sciences (now Earth and Atmospheric Sciences), he established and developed the Atmospheric Sciences research programs and educational curricula.
- He developed and served as the Founding Director of the Southern Oxidants Study, the leading program to attempt to elucidate the causes of ground-level ozone pollution in the Southern United States and the characteristics of an effective approach for its mitigation.
- He established and developed the Environmental Sciences, Technology, and Policy program at Georgia Tech and through this, helped create the Georgia Environmental Technology component of the Georgia Research Alliance.

Selected Current Urban and Regional Air Quality Related Research at Georgia Tech

The Southern Oxidants Study (SOS). Researchers in the School of Earth and Atmospheric Sciences at Georgia Tech created the Southern Oxidants Study (SOS), a strategic alliance of research scientists, engineers, and air quality managers from universities, federal and state governments, industry, and public interest groups, to design and execute scientific research and modeling programs that will increase the understanding of ozone accumulation in the atmosphere. The SOS research program includes:

- Continuous monitoring of regional ozone concentrations, weather and climatic factors, and ozone precursor concentrations.
- Periodic intensive studies of ozone concentrations, ozone precursor concentrations, and weather factors in selected urban ozone non-attainment areas in the South. The first SOS urban intensive study was conducted in the Atlanta metropolitan area in 1992. Subsequent intensive studies have taken place or are planned to take place in the Nashville/Middle Tennessee area and the Houston, Texas area.

Since its inception in 1988 and continuing through present, SOS has received funding from a variety of sources and agencies including the US Environmental Protection Agency, multiple southeastern states, and other private stakeholders.

Southern Center for the Integrated Study of Secondary Air Pollutants (SCISSAP).

Recognizing that a basic scientific understanding of the chemistry and physics of the atmosphere are a prerequisite for designing effective control strategies for secondary pollutants; and recognizing that the concentrations of secondary pollutants in the atmosphere are often co-dependent because of interacting chemical reactions, the Southern Center for the Integrated Study of Secondary Air Pollutants (SCISSAP) was established at the Georgia Institute of Technology. The long-term mission of SCISSAP is the development of the scientific understanding and analytical tools that underpin the design and implementation of an effective and integrated control strategy for secondary pollutants, using the atmosphere of the southern United States as a natural laboratory.

SCISSAP is carried out in collaboration with the Southern Oxidants Study (SOS) and the universities, government laboratories, and private sector entities that comprise the SOS Science Team. SOS has been dedicated to a comprehensive study of regional and urban ozone and other gas-phase oxidants in the South. By collaborating with SOS, SCISSAP benefits from the significant technological and human resources of the SOS Science Team. By developing an independent research team with its own unique expertise, SCISSAP provides a mechanism for undertaking a new and broader scientific objective: the integrated study of secondary pollutants. This will be accomplished via a case study approach that focuses on subsets of secondary air pollutants and their interactions within the South.

PM Supersite. The U.S. Environmental Protection Agency (EPA) has selected Atlanta as one of the Nation's first SuperSites dedicated to the study of fine particles (or PM_{2.5}). Georgia Tech and the Southern Oxidants Study (SOS) has been chosen to develop and implement a scientific research plan for this initial SuperSite effort.

The Atlanta SuperSite's first major field experiment was a four week long campaign aimed at comprehensively addressing issues related to the measurement and characterization of fine particles in the polluted or urban atmosphere. The experiment was run during the month of August, 1999 with its main focus being the deployment of a wide array of instrumentation at a measurement site located on Jefferson Street in Midtown Atlanta.

Ozone Forecasting. Since 1996, research scientists in the School of Earth and Atmospheric Sciences have led the development of the State of Georgia's program to forecast ground-level ozone. Their efforts to create the tools necessary to assess the meteorological and emissions conditions that affect ozone, and to successfully apply these tools in a forecasting framework, have benefited the Georgia Environmental Protection Division's Partnership for a Smog-free Georgia, and the citizens of the Atlanta metropolitan area. The Georgia Environmental Protection Division provides continuous funding for this program.

Southern Appalachian Mountain Initiative (SAMI). Researchers in the School of Civil and Environmental Engineering at Georgia Tech have developed and applied the computer models that are used to assess air quality and the effectiveness of potential controls for the Southern Appalachian Mountain Initiative (SAMI). SAMI is a geographic initiative focusing on issues pertaining to air quality and its effects on the resources in the Southern Appalachian Mountains. It is a voluntary and cooperative effort on behalf of approximately 100 entities, including state and federal agencies, utilities and other industries, universities, environmental and public interest groups, and economic development agencies.

SAMI's mission statement is: "Through a cooperative effort, identify and recommend reasonable measures to remedy existing and to prevent future adverse effects from human-induced air pollution on the air quality related values of the Southern Appalachians, primarily those in Class I park and wilderness areas, weighing the environmental and socioeconomic implications of any recommendation." The areas of concern are the Southern Appalachian Mountains within the boundaries of Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

Strategies for Metro Atlanta's Regional Transportation and Air Quality (SMARTRAQ). Researchers in Georgia Tech's College of Architecture and School of Civil and Environmental Engineering are now conducting research to integrate land use with not only transportation but also air quality and the level of household physical activity. This program will provide the research, knowledge base, and the forum to communicate that knowledge about transportation, land use, and the environment.

SMARTRAQ will reflect the recommendations from current related initiatives including the Metropolitan Atlanta Transportation Initiative, the Growth Management Reassessment Task Force, the Atlanta Regional Commission's Stakeholder Visioning Process and Regional Development Guide, and the Voluntary Ozone Action Program Implementation Task Force. The SMARTRAQ program was made possible by a grant sponsored by the Georgia Department of Transportation, Federal Highway Administration, U.S. Environmental Protection Agency, Turner Foundation, and the Centers for Disease Control and Prevention.

Ambient Monitoring. The Atmospheric Chemistry Group of Georgia Tech's Air Quality Laboratory (AQL) is dedicated to developing and implementing state-of-the-art measurement instruments to collect air quality and meteorological data. The group played a lead role in collecting chemical and meteorological measurements for the Southern Oxidants Study. Research scientists from the Atmospheric Chemistry Group have also been heavily involved in the Pacific Exploratory Missions (PEM) of NASA's Global Tropospheric Experiment, which seek to study natural atmospheric systems in remote areas. Meteorologists with the AQL also collect local data on atmospheric conditions -- such as wind speed and direction, temperature, and solar radiation -- that influence air quality measurements. These measurements are used for air quality forecasts, such as those utilized by the Atlanta Ozone Forecasting Program, and for interpretation of air quality data.

Remote Sensing of In Situ Vehicle Emissions. The Mobile Sources Group of Georgia Tech's Air Quality Laboratory (AQL) evaluates mobile sources of air pollution under real-world and laboratory conditions. The group is a national leader in onroad automobile emissions research, using remote sensing technology to collect roadside measurements of vehicle tailpipe emissions. Remote sensing technology is quickly becoming an important tool for measuring onroad vehicle emissions for both scientific and regulatory purposes. AQL's Mobile Sources Group is a national leader in this growing research area. Since 1991, AQL has been either a participant or the lead organization on more than ten major remote sensing studies involving some 2.5 million vehicles. AQL has conducted remote sensing studies in Atlanta, GA; Boston, MA; Burlington, VT; Baltimore, MD; New York, NY; Raleigh-Durham, NC and Nashville, TN. AQL has also conducted site surveys for remote sensing studies in Houston, TX, Portland, ME and Chicago, IL. Upcoming studies may include Burlington VT; Gary, IN; New York, NY; Pittsburgh, PA; Philadelphia, PA; and Vancouver, BC.